

Work Order ID 83802

May-30-12 3:43:51 PM

83802

Page 1

Item ID: D407-667-105TRN

Accept:

N900040100

Setup

Start *NS1*

Revision ID:

Item Name: Crosstube Turning Detail

Stop

NS2

Start Date: 26/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 10/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: MLJ

Date: 12/05/31 Tooling:

Date:

Run

Start *NR1*

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr								
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D407-667-145 Rev C

100 0.00

100 MORI SEIKI CNC LATHE LARGE

Mori Seiki

Mori Seiki CNC Lathe Large

Memo 0.00

1-Fill tube with sand & install plugs DT8673 on both ends as per Folio FA249

2-Turn first side as per Folio FA249

3-Blend transition lines only, **do not sand whole tube**.

FOLIO REV: A

DWG REV: C

*Use mill bastard file, brush file repeatedly with file card.

*Do not use sandpaper coarser than 320 grit.

1 Ø KC 12-8-25

110

QC1- Inspect dimensions to dimension sheet 0.00

110 QC

Memo 0.00

Quality Control

1 Ø KC 12-8-25

W/O: 83802

WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D407-667-105TRN PAR #: _____ Fault Category: X - Lubrication NCR: Yes No DQA: *[Signature]* Date: 12/09/20
 Resolution: _____ Disposition: *WIP - W/ Rework* QA: N/C Closed: *Closed* Date: 12/9/20

WORK ORDER NON-CONFORMANCE (NCR)								
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
12/09/29	100	Cuff on tube is out of tolerance. 2.243" - 2.237"	DAS 12/09/29 2020	Acceptable	DAS 12/09/29 2020 12/09/29	JW 12-9-4	DAS 12/09/29 2020 12/09/29	DAS 16/09/20 2020 12/09/29
		L.C material not straight						

NOTE: Date & initial all entries

Work Order ID 83802***83802***

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Page 2

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Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

I20

120

Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

0.00

1

∅

Memo

0.00

1-Turn second side as per Folio FA249

2-Blend transition lines only, **do not sand whole tube**:
 *Use mill bastard file, brush file repeatedly with file card.
 *Do not use sandpaper coarser than 320 grit.

FOLIO REV: ADWG REV: C

3-Remove sand and plugs

4-Scribe part # and batch # using vibrating stylus as per Dwg D206-667-145
 inside of Cuff(Do not engrave on outside of tube)

Mgn. L
12/08/25

130

QC1- Inspect dimensions to dimension sheet

0.00

1

∅

130

QC

Quality Control

Memo

0.00

Mgn. L
12/08/25

W/O:		WORK ORDER CHANGES				
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr

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NOTE: Date & initial all entries

Work Order ID 83802

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Page 3

Item ID: D407-667-105TRN

Accept

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Start

NS1

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Item Name: Crosstube Turning Detail

Stop

NS2

Start Date: 26/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 10/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

140

QC8- Inspect parts - second check

0.00

140

QC

Quality Control

JW

12-9-4

145

145

Crosstubes

Memo

0.00

Crosstubes

GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

DP 12-9-14

150

Crosstubes Chemical Conversion

0.00

150

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

D 12-9-14

1-Pressure wash and acid bath inside
and out use red scotch brite.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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NOTE: Date & initial all entries

Work Order ID 83802

May-30-12 3:43:51 PM

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Page 4

Item ID: D407-667-105TRN

Accept

N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Turning Detail

Stop

NS2

Start Date: 26/04/2012 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 10/05/2012 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals:	Process Plan:	Date:	Tooling:	Date:	Run	Start	*NR1*
	QC:	Date:	SPC (Y/N):	Date:		Stop	*NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160 *160* QC Quality Control	QC1-Inspect Chemical Conversion Coat Memo	0.00 0.00	DAS 16	17/05/18					

170 *170* Packaging Packaging	Packaging Memo	0.00 0.00							
--	-----------------------	------------------	--	--	--	--	--	--	--

TW 12-9-18

180 *180* QC Quality Control	QC21-Final Inspection - Work Order Release Memo	0.00 0.00							
---	--	------------------	--	--	--	--	--	--	--

12/9/18 JJ

11/20/18 JF

W/O:		WORK ORDER CHANGES							
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector	
			Initial Chief Eng	Action Description Chief Eng	Sign & Date				

NOTE: Date & initial all entries

Picklist Print

May-30-12 3:43:55 PM

Page 1

Work Order ID: 83802

83802
D407-667-105TRN

Parent Item: D407-667-105TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 26/04/2012

Required Date: 10/05/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:a08.02.28 new issueEC
 IPP Rev B 08.04.02 Removed polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6010-115		Manufactured	No			110	Each	15.0000	1	1			**

D6010-115

Crosstube Material

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>		
LG	15			
38343	15		1	KE (2-8-24)

W/O:		WORK ORDER CHANGES					
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	83802
Description: Crosstube Assembly	Part Number:	D407-667-145
Inspection Dwg: D407-667-145 Rev: C		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.243	/	Vern	CWCL-08
	1.865	+0.005/-0.000	1.870	/		
	1.878	+0.005/-0.000	1.883	/		
	1.970	+0.005/-0.000	1.975	/		
	2.030	+0.005/-0.000	2.033	/		
	2.165	+0.005/-0.000	2.169	/		
	0.125	+/-0.010	.125	/	Vern	CWCL-08
	R0.063	+/-0.010	.063	/	RG	
	R0.500	+/-0.010	.500	/		
	R0.063	+/-0.010	.063	/		
	4.438	+/-0.030	4.440	/	Vern	CWCL-08
SIDE B	2.240	+0.005/-0.000	2.242	/	Vern	CWCL-08
	1.865	+0.005/-0.000	1.870	/		
	1.878	+0.005/-0.000	1.883	/		
	1.970	+0.005/-0.000	1.975	/		
	2.030	+0.005/-0.000	2.033	/		
	2.165	+0.005/-0.000	2.169	/		
	0.125	+/-0.010	.125	/	Vern	CWCL-08
	R0.063	+/-0.010	.063	/	RG	
	R0.500	+/-0.010	.500	/		
	R0.063	+/-0.010	.063	/		
	4.438	+/-0.030	4.440	/	Vern	CWCL-08
	113.20	+/-0.020	113.20	/	tape	LG-22

Measured by:	MML	Audited by:	JW	Preliminary Approval:	
Date:	12/08/29	Date:	12-9-4	Date:	

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-105)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	09.06.11	Dwg Rev updated	KJ	
D	11.06.21	Tolerance revised for 4.438 dimension	KJ	<i>[Signature]</i>

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

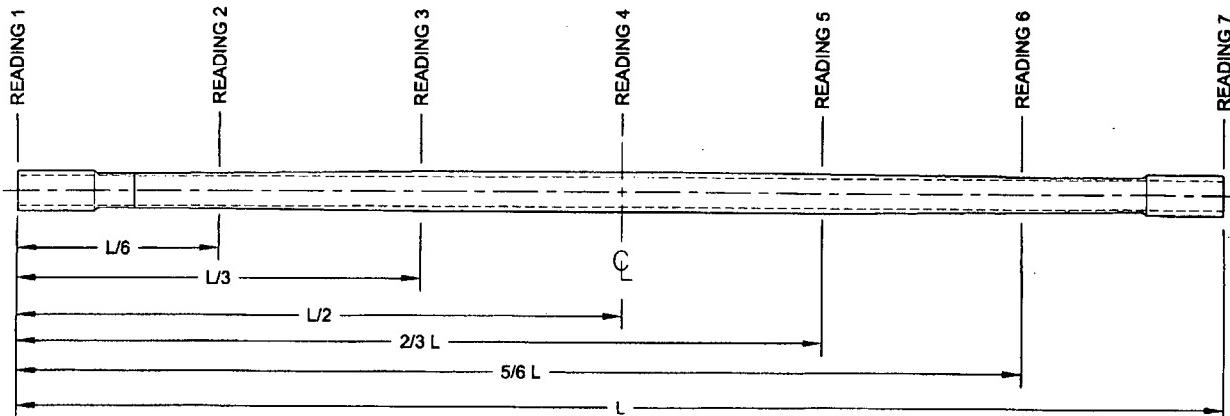
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	83802
Description: Crosstube Assembly	Part Number:	D407-667-145
Inspection Dwg: D407-667-145 Rev: C		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.316	.317	.330	.328	.014	
READING 2 L=	.161	.156	.168	.166	.017	
READING 3 L=	.217	.223	.236	.234	.019	
READING 4 L=	.320	.327	.331	.324	.011	0.042"
READING 5 L=	.234	.225	.222	.226	.012	
READING 6 L=	.175	.161	.149	.157	.026	
READING 7 L=	.330	.331	.315	.307	.023	

Calibration Result

Actual Block Thickness: .100 - .500

Sitescan 250 Measured Thickness: .100 - .500

Measured by:	MML	Audited by:	ZW	Preliminary Approval:	
Date:	12-8-25	Date:	12-9-4	Date:	

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-105)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	09.06.11	Dwg Rev updated	KJ	
D	11.06.21	Tolerance revised for 4.438 dimension	KJ	
E	12.06.04	Wall thickness form added	KJ	

Item	Qty	Part Number	Description
1	X	D407-667-145	CROSSTUBE ASSEMBLY (407 HIGH FWD)
2	1	D6010-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2891-1	SUPPORT
6	4	D3595-063-395	RUBBER CUSHION
7	4	MS21920-20	CLAMP (OR MS21920-21)
8	14	MS20601AD4W10	RIVET (OR NAS9302B-4-10)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6010-115
FINISHED LENGTH = 113.20±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-145" AND BATCH NUMBER ON
INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 17.8 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY,
TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE
TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2891-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER
QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-20 CLAMPS (OR -21) WITH D3595-063-395 RUBBER CUSHIONS TO SECURE
THE D2891-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS
ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN
SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE

WORK ORDER
NO. 83802 MLJ
12/05/13

DEO ATTACHED

ECN #11-615
11-07-26

UNDER REVIEW

09/11/12

RELEASED
09/11/12 MLJ

C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-395 WAS D2856-400-694 (ZN D6-2 & A5-2); REMOVED REF. 7 ADD TOLERANCES (ZN C6-3, C4-3, D2-3); RELOCATED FLAG #6 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUTUBES	PH	05.07.26
A	NEW ISSUE	CP	02.05.08
REV.	DESCRIPTION		
DESIGN	<i>DP</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF	REV. C	
CHECKED	<i>DP</i>	DRAWING NO. D407-667-145	
MFG. APPR.	<i>DP</i>	SHEET 1 OF 4	
APPROVED	<i>DP</i>	TITLE CROSSTUBE ASSY (407 HIGH FWD) NTS	
DE APPR.	<i>DP</i>	SCALE	
DATE	08.11.06	COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY OTHER PURPOSE THAN THAT FOR WHICH IT WAS PROVIDED BY DART AEROSPACE LTD UNWRITTEN PERMISSION FROM DART AEROSPACE LTD IS REQUIRED FOR ANY USE	

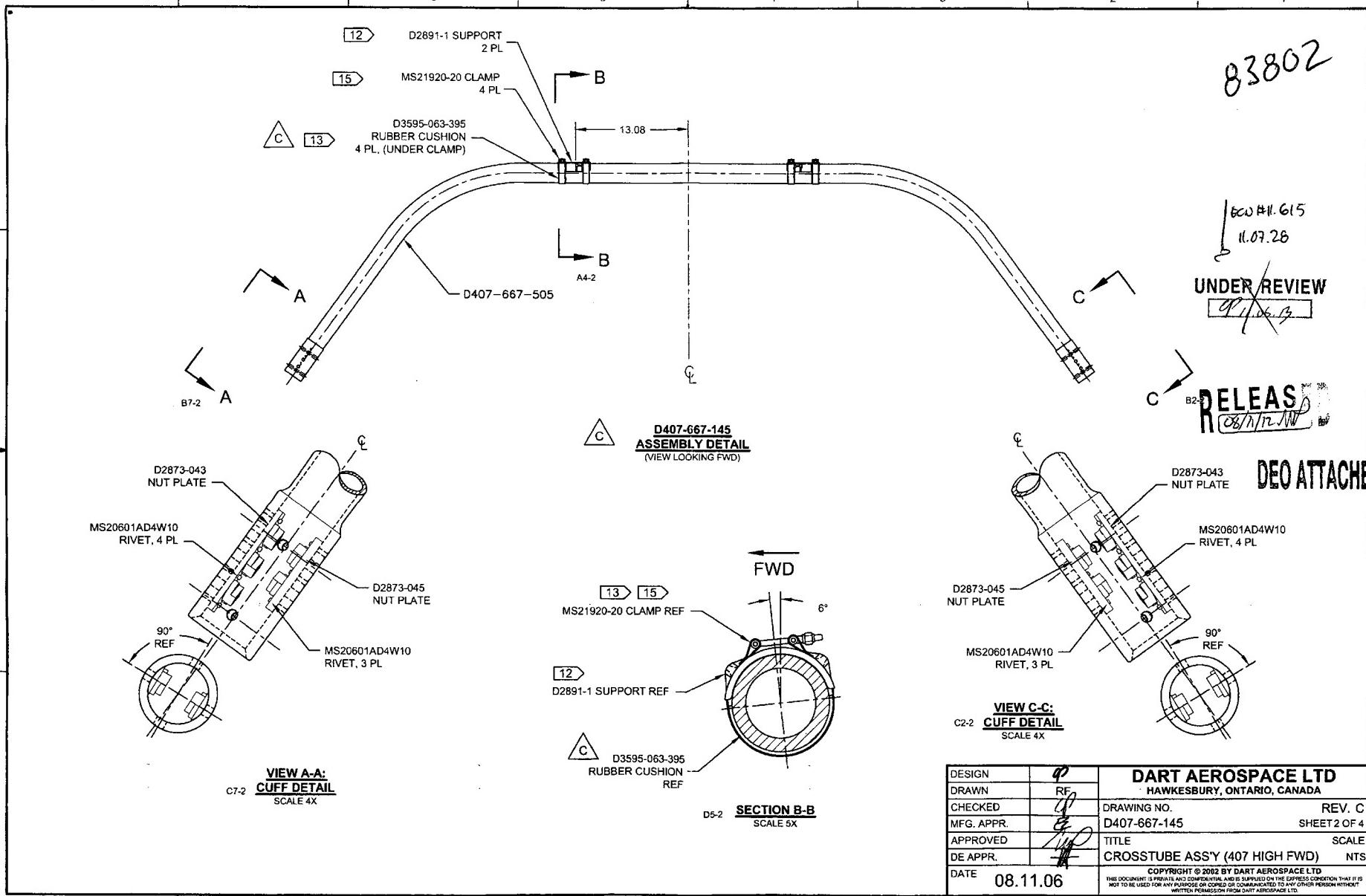
W/O:		WORK ORDER CHANGES						
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NOTE: Date & initial all entries



DESIGN	<i>[Signature]</i>
DRAWN	REF
CHECKED	<i>[Signature]</i>
MFG. APPR.	<i>[Signature]</i>
APPROVED	<i>[Signature]</i>
DE APPR.	<i>[Signature]</i>
DATE	08.11.06

DART AEROSPACE LTD
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. D407-667-145 REV. C
SHEET 2 OF 4

TITLE CROSSTUBE ASSY (407 HIGH FWD) NTS

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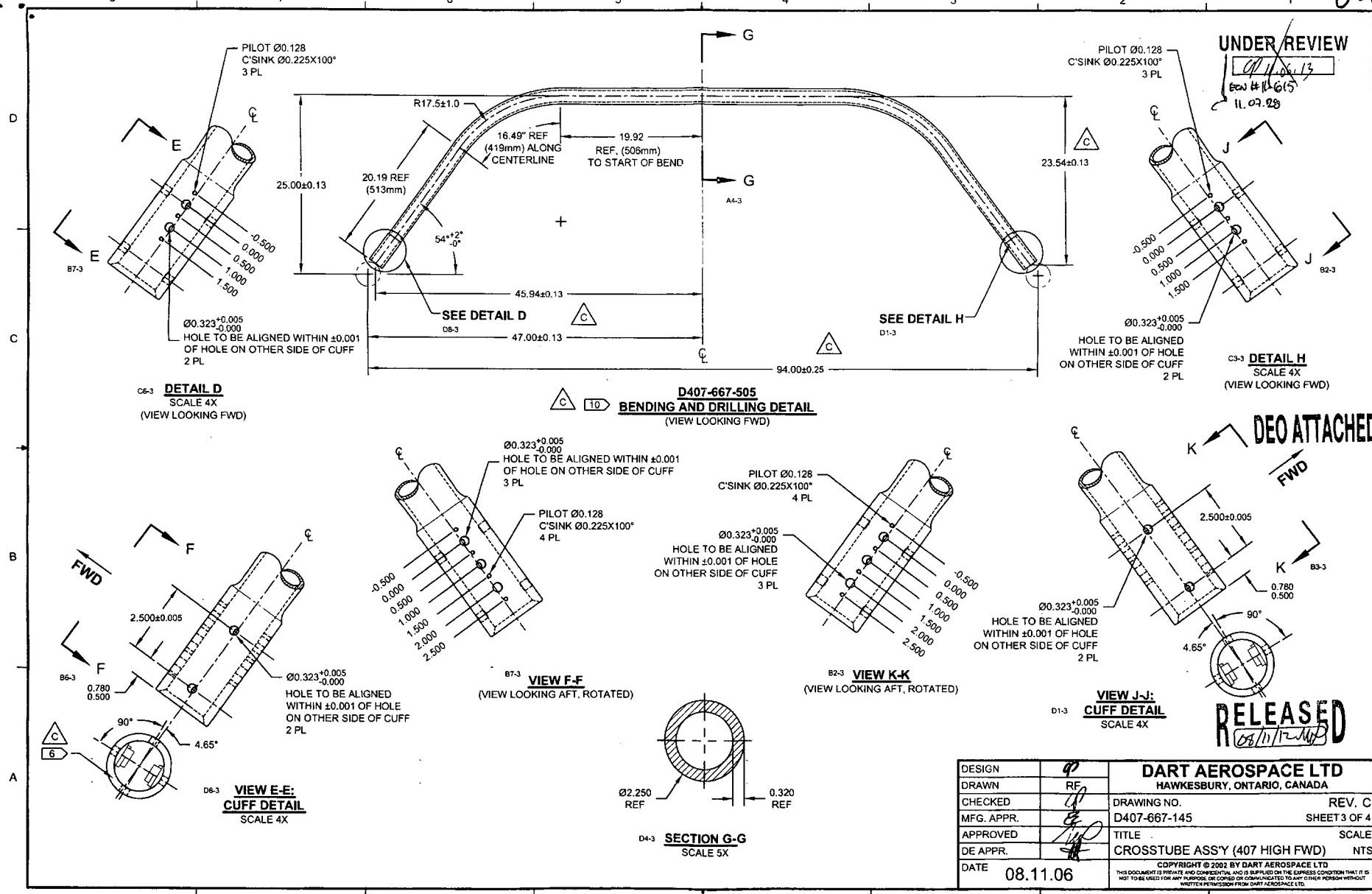
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NOTE: Date & initial all entries

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DESIGN	<i>9P</i>	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>CP</i>	DRAWING NO.	REV. C
MFG. APPR.	<i>CE</i>	D407-667-145	SHEET 3 OF 4
APPROVED	<i>SP</i>	TITLE	SCALE
DE APPR.	<i>SP</i>	CROSSTUBE ASS'Y (407 HIGH FWD) NTS	
DATE	08.11.06	COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS THE PROPERTY OF DART AEROSPACE LTD. IT IS NOT TO BE USED FOR ANY PURPOSE, OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT THE EXPRESS WRITTEN CONSENT OF DART AEROSPACE LTD.	

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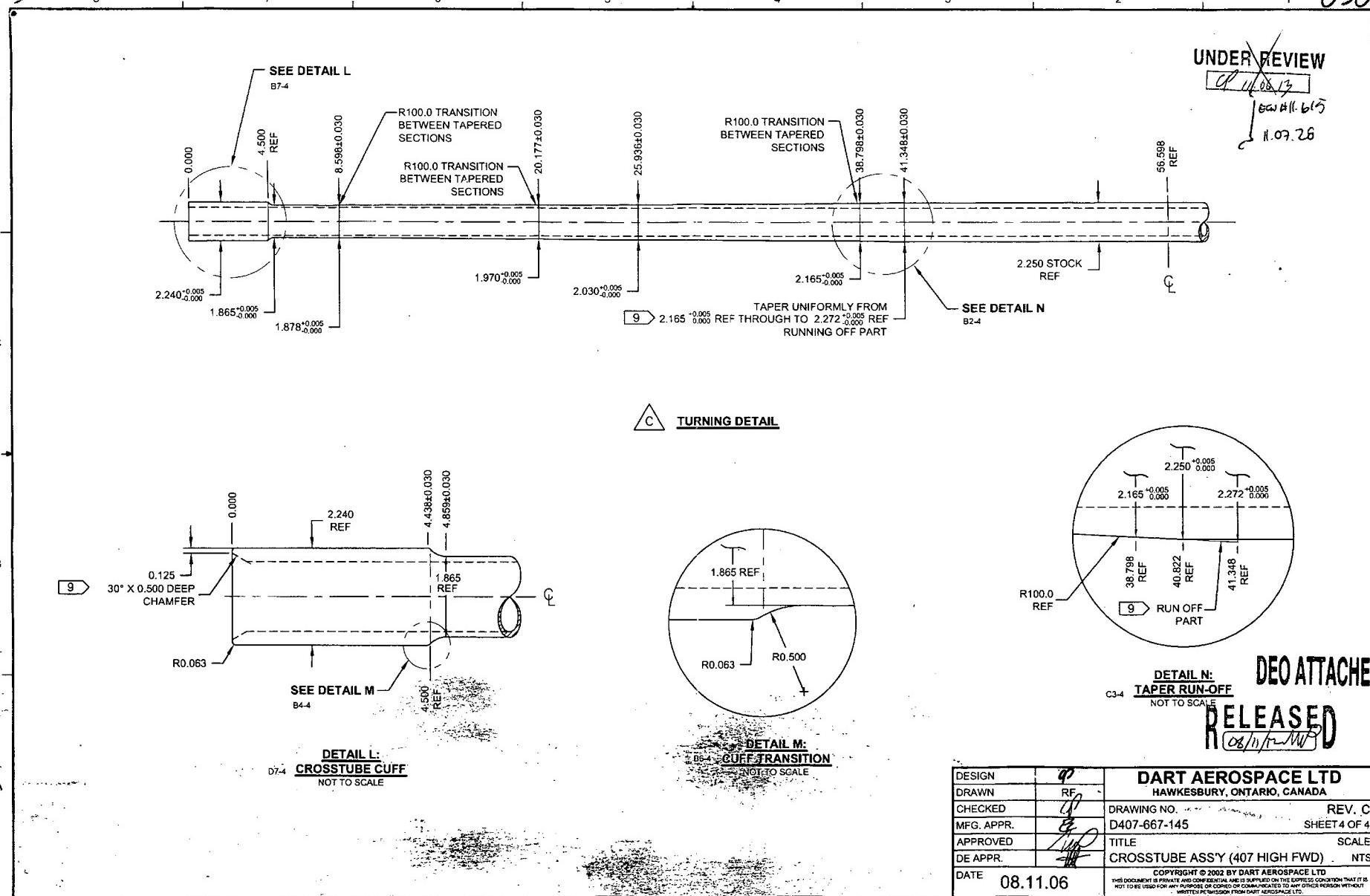
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DESIGN	7	DART AEROSPACE LTD
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA
CHECKED	<i>[Signature]</i>	REV. C
MFG. APPR.	<i>[Signature]</i>	D407-667-145 SHEET 4 OF 4
APPROVED	<i>[Signature]</i>	TITLE
DE APPR.	<i>[Signature]</i>	SCALE
DATE	08.11.06	CROSSTUBE ASS'Y (407 HIGH FWD) NTS

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DRAWING NO. D407-667-145	TITLE CROSSTUBE ASS'Y (407 HIGH FWD)	REV. C	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D407-667-145-C-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>90</i>	CHECKED <i>ASS</i>		MFG. APPR. <i>IS</i>	APPROVED <i>MD</i>	DE APPR. <i>W</i>		
DATE 11.07.15	DATE 11.07.22		DATE 11.07.22	DATE 11.07.22	DATE 11.07.21	DATE 11.07.21	

PURPOSE:

REPLACE MAGNOBOND WITH PROSEAL.

CHANGE:**IS:**

Item	Qty -145	Part Number	Description
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
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NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2891-1 SUPPORT: ABRADE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

WAS:

- 12) INSTALL D2891-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED
2011-07-28
W

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries